ADDENDUM TO THE RCRA FACILITY INVESTIGATION AND STABILIZATION/CORRECTIVE MEASURES PLAN

Monsanto Nitro Plant

August 7, 1995

Prepared for:

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Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information including, the possibility of fine and imprisonment for knowing violations.

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1.0 PURPOSE

This Addendum is designed to clarify, modify and expand upon the investigation results and proposed scope of work contained in the document titled "RFI Report and Stabilization/Corrective Measures Plan (RFI/SCMP), Monsanto Company, Nitro West Virginia." The original document was prepared by Roux Associates, Inc. on behalf of Monsanto Company (Monsanto) and was submitted to the United States Environmental Protection Agency (USEPA) on May 5, 1995.

This Addendum incorporates comments resulting from the USEPA review of the RFI/SCMP, as provided in their correspondence to Monsanto dated June 16, 1995. Due to the nature of the comments, Monsanto is herein providing an addendum document which further describes the proposed technical approach for the stabilization/corrective measures plan and risk evaluation in Sections 2.0 and 3.0, respectively. Specific comment by comment responses are provided in Sections 4.0. Section 5.0 presents the updated project schedule. Figures and Plates which have been revised to reflect USEPA comments are also provided.

2.0 TECHNICAL APPROACH FOR STABILIZATION/CORRECTIVE MEASURES PLAN IMPLEMENTATION

As presented in the RFI/SCMP, determination of the need for, and scope of, potential stabilization/corrective measures at the facility are the primary objectives of the upcoming stabilization/corrective measures plan activities. For the separate-phase hydrocarbon product observed in MW-7, stabilization measures have been evaluated and the technical approach for product recovery is presented in Section 2.1 below. In order to define appropriate measures for site ground water and soils, a site-specific risk evaluation will be implemented in all instances where elevated constituents concentrations were detected relative to permit-specified levels. The rationale and technical approach for integrating risk evaluation activities are provided in Sections 2.2 and 2.3 below for ground water and soils/sediments, respectively.

2.1 Separate-Phase Product Stabilization/Corrective Measures

Floating separate-phase product, kerosene, has been observed in monitoring well MW-7. The product is related to a former underground storage tank previously located proximate to the well. A previous study indicated the separate-phase product is limited in horizontal extent to less than 100 feet. This observation supports the finding that the separate-phase product is relatively immobile in the silty layer which is predominant in the upper portion of the aquifer, and does not extend to the Kanawha River. The apparent thickness of the product observed in MW-7 was observed to be approximately 1 foot in September of 1994.

Two separate-phase product systems were installed in the late 1980s to remove the kerosene. First, a dual-pump system incorporating a ground-water depression pump and a skimmer pump was used. The pumped ground water was discharged into the facility sewer system and the removed separate-phase product was collected in drums and properly disposed off site. Due to low yield, the dual-pump system was deactivated and removed. The second system included a reciprocating cylinder (sucker rod) pump which removed only separate-phase product. The recovered separate-phase product was collected in drums and properly disposed off site. The system was operated for approximately one year then was deactivated due to operational difficulties. Both systems were installed in well R-2 which is located approximately 20 feet south of MW-7.

Monsanto proposes to install a product recovery system to address the separate-phase product recovery during the Stabilization/Corrective Measures Plan activities at the site. The specific elements of the recovery system will be selected based on the evaluation provided below.

2.1.1 System Components

The product recovery component can be accomplished via total fluids extraction or product-only extraction. A total fluids system consists of a single pump which evacuates all fluid from the well regardless of fluid density. The extracted fluid is a mix of separate-phase product and ground water. A product-only recovery system isolates the separate-phase product from ground water by using a hydrophobic screen. Some product recovery systems include dual pumps, one to depress the proximate water table and the other to recover separate-phase product (such as the first system installed at R-2). Other product recovery systems are designed to recover only separate-phase product (such as the second system installed at R-2).

Treatment is required for the recovered separate-phase product, ground water, or combined fluids extracted, dependent upon the type of recovery system. Extracted fluids may be collected in temporary storage containers such as drums or tanks for off-site treatment or may be discharged to the facility sewer system for on-site treatment at the Wastewater Treatment Plant. Fluids may be pretreated prior to discharge to the facility sewer system. Pretreatment for the fluids of concern may include oil/water separation or solids removal.

Level controls and float switches may be necessary to insure proper operation of the recovery system. Controls will be installed, as necessary, to properly cycle the pumps of the product recovery component and for system shutdown to maintain fail safe conditions. Controls may be installed to monitor additional parameters such as water level, product thickness, pumping rate, or volumetric rate, if appropriate.

Product recovery systems may be powered electrically or pneumatically. The selection of power sources will be made based on available utilities and efficiency of operation.

The optimum overall system will be selected based on ability to extract recoverable product at a suitable rate, overall efficiency of operations, durability, and cost-effectiveness. The selected

equipment will be acquired in a time frame consistent to allow installation and startup within the project schedule.

2.1.2 System Installation and Startup

The recovery system will be installed in MW-7 and/or R-2 after evaluating the integrity of each well. Installation will consist of the following task elements:

- utility installation;
- well head modification;
- recovery system installation;
- tank/pretreatment installation;
- discharge line tie-in; and,
- startup.

Each task is discussed below.

Utility installation consists of establishing appropriate power at the location of the recovery system. If electric power is selected, the utility installation will likely include connection to existing facility electric sources proximate to the recovery system and installing electric power wires/conduits to the recovery system. If pneumatic power is selected, utility installation may either include connection to the facility compressed air or installation at a local compressed gas source. The local gas source could be either a compressed gas cylinder or an air compressor.

Well head modification will likely be necessary and will entail adapting the top of the well to receive the recovery system and associated power, control, and discharge lines. Typically a handhole or small vault is used to complete the wellhead.

The recovery system installation will entail placement of the pump in the well, power connection, and controls connection.

The tank/pretreatment installation, if necessary for the selected system, will include placement of the necessary storage tanks or pretreatment equipment and connections to the recovery system.

The discharge line connection, if necessary for the selected system, will include trench excavation, conveyance piping and valve installation, and miscellaneous activities necessary to complete connection to the facility sewer system. The tie-in is anticipated to be made into Lift Station Number 1 (located near the storm and equalization tanks), or at a location along the sewer line running from Lift Station Number 1 to the Wastewater Treatment Plant.

Startup of the recovery system will include energizing the pump, testing the controls and general operations, and initial adjustment of the system.

2.1.3 System Operation and Monitoring

System operation will include observing the system and performing routine maintenance to insure continued proper operation. Monitoring will include periodic measurement of apparent product thickness and measurement of the volume of fluid extracted to help determine system performance. Additionally, monitoring will provide information to determine when it is appropriate to deactivate the system. Monitoring of ground water throughout the facility will be performed as part of the site-wide ground water stabilization/corrective measures program. Ground-water monitoring will focus on sampling of select wells for constituents of concern at the site. Details of this monitoring program will be provided in the Stabilization/Corrective Measures Study Report to be submitted at the conclusion of the stabilization/corrective measures plan activities.

2.2 Ground Water

The ground-water analytical data collected during the RFI indicates that the highest observed dissolved-phase concentrations occur in two primary areas of concern. Residual concentrations in these two areas were elevated [exceeding 1,000 micrograms per liter ($\mu g/\ell$)] in shallow ground water for select chlorinated and aromatic volatile organic compounds including TCE and benzene, and for select chlorinated phenolic compounds. The vertical distribution data identified the ground-water impact is predominantly restricted to the shallow (A-Series) monitoring wells.

These shallow wells are representative of the less permeable silts and sands associated with the upper part of the alluvial aquifer. The aquifer testing data supports that the shallow ground water and associated constituents are not very mobile and do not represent a significant flow contribution to the Kanawha River, which has been identified as the discharge boundary for site ground water. With no potable use of ground waster or surface water in the area, potential receptors are limited to non-potable use of the Kanawha River.

Risk evaluation will be an integral component of the Stabilization/Corrective Measures Plan for ground water and will be performed concurrently with the implementation of the separate-phase product stabilization measures. The primary objectives of the risk evaluation will be to verify the constituents of concern, the extent of the primary areas of concern, and to establish the need for and scope of potential stabilization/corrective measures for site ground water. As requested by the USEPA in their June 16, 1995 comments, the site-specific risk evaluation will be used to address all units where sampling results indicated elevated constituent concentrations relative to the permit-specified levels. The conceptual site model and proposed risk evaluation approach for ground water are further described in Section 3.0.

Upon completion of the site-specific risk evaluation, the primary ground-water areas of concern which require stabilization/corrective measures will be refined. An initial screening of potential stabilization/corrective measures was presented in the RFI/SCMP and included the following technologies:

- intrinsic remediation and monitoring;
- in-situ ground-water treatment; and
- ground-water extraction and on-site treatment.

The selection of the appropriate technology will be based on the: engineering feasibility; demonstrated reliability; efficiency; ease of operation, maintenance and repair; and will include the evaluation elements proposed in Section 8.2.1 through 8.2.3 of the original RFI/SCMP. Results of these evaluations will be presented in the Stabilization/Corrective Measures Report as previously described in Section 8.3 of the RFI/SCMP.

2.3 Soils/Sediments

The soil analytical data collected during the RFI indicates detections above permit-specified levels for only one volatile organic constituent (tetrachloroethene), two inorganic constituents (arsenic and beryllium), and several base neutral (BN) or polynuclear aromatic hydrocarbons (PAHs).

In order to determine the need for and scope of potential stabilization/corrective measures for site soils, site-specific risk evaluations as well as background evaluations will be performed by Monsanto. These evaluations will be completed as part of the overall Stabilization/Corrective Measures Plan. As requested by the USEPA in their June 16, 1995 comments, the site-specific risk evaluation will be used to address all units where sampling results indicated elevated constituent concentrations relative to the permit-specified levels. The conceptual site model and proposed risk evaluation approach for soils are further described in Section 3.0.

A preliminary review of the distribution, as well as potential sources, of inorganic and PAH data suggests that the observed concentrations may be consistent with regional background levels and/or the result of historic fill operation, and not the result of historic plant processes. Monsanto will utilize a tiered approach to resolving potential background issues. First, Monsanto will include all constituents which exceed permit-specified levels in the site-specific risk evaluation. If the risk-based concentrations indicate that potential background levels need to be further supported, then Monsanto will initiate the following background evaluations. Background evaluations will include, as necessary, compilation of regional soil analytical data, historical record review for potential sources (both at the site and in the region), and collection of additional site-specific background soil samples for the analysis of the constituents interest. Should the risk and background evaluations indicate that stabilization/corrective measures are warranted for site soils, the following potential technologies will be considered:

- intrinsic remediation and monitoring;
- capping/physical isolation; and
- excavation and treatment/disposal.

The selection of the appropriate measures will be based on the same evaluation criteria described above for potential ground-water stabilization/corrective measures. Results of these evaluations will be presented in the Stabilization/Corrective Measures Study Report as previously described in Section 8.3 of the RFI/SCMP.

3.0 RISK EVALUATION TECHNICAL APPROACH

USEPA Region III has provided Monsanto the opportunity to prepare a site-specific risk assessment to demonstrate whether constituents identified in soil and ground water at the Site, that exceed current permit levels, could result in a potential risk to human and/or ecological receptors. The purpose of the RCRA risk evaluation workplan for the Nitro Plant described in this section will be to outline a focused and protective procedure for evaluation of potential human and ecological risk. The proposed approach is to screen potential receptors, exposure pathways and identified constituents using conservative risk-based criteria to produce a limited number of potentially important exposure pathways/receptors/constituents of interest. Selected scenarios will be incorporated into a comprehensive site-specific risk assessment that will define potential risk to human and ecological receptors.

3.1 Identification of Constituents of Interest

Constituents of interest will be selected and evaluated consistent with USEPA guidance as an initial step in the Monsanto, Nitro, West Virginia Site RCRA Risk Assessment. Documents consulted to assist in this task will include:

- "Selecting Exposure Routes and Contaminants of Concern by Risk-Based Screening", (EPA/903/R-93001); a USEPA Region III technical guidance document (USEPA, 1993)

- "Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part A" (RAGS) (EPA/540/1-89/002), (USEPA, 1989).

A conceptual model which illustrates the approach for defining constituents of interest has been developed, and is included as Figure 1 in Attachment A. A detailed outline of specific procedures that will be adopted to select constituents of interest is presented in the following sections.

3.1.1 Soil and Sediments

The approach to selecting constituents of interest in soil and on-site sediments will be based on Region III guidance using current Region III risk-based concentrations (RBCs) for industrial soil.

As outlined in the guidance a four step process will be utilized to identify constituents of interest for the human health and ecological risk assessment:

- Since a formal data quality review has not been performed, all data will be assumed valid and included in further evaluations. The inclusion of all available data in the risk assessment is the most conservative approach outlined in Agency guidance. Additionally, for non-detects where the detection limit exceeded permit specified limits, assumed concentrations will be developed consistent with Agency guidance. When screening chemicals for further evaluation maximum analytical values will be compared to permit levels to eliminate constituents that are within the specified limits.

- For constituents in soil and on-site sediments that exceed the assigned permit levels maximum concentration data will be compared to current USEPA Region III RBCs for industrial soil to screen out constituents which would have no effect on the overall risk estimates for the site. If RBCs are not available for a complete exposure pathway, RBCs may be developed using equations provided in Region III guidance and USEPA developed toxicity parameters. In the absence of USEPA developed toxicity parameters, appropriate reference doses or carcinogenic potency factors will be developed using the best available toxicological studies. For the ecological evaluation, when RBC screening values are not identified, appropriate ecological screening criteria will be developed consistent with available USEPA guidance for conducting ecological assessments at Superfund sites.

- Based on site-specific factors and previous comments provided by USEPA to Monsanto, consideration will be given to re-including constituents into the risk assessment that had been eliminated by the procedures described above. Specific attention will be given to constituents with detection limits which exceed permitted concentrations.

- Background information for constituents of interest, when available, will be evaluated to provide a basis for screening from quantitative analysis those constituents that are clearly not related to activities at the Site, even if they exceed RBCs for industrial soil.

The rationale for retaining or eliminating constituents identified in soil and sediments during each step of the selection process will be documented in the risk assessment. The risk assessment will present quantitative estimates of risk for selected constituents of interest for each complete exposure pathway identified in the conceptual site model (described in Section 3.2).

3.1.2 Ground Water

The approach for selecting constituents of interest in on-site ground water will follow the same basic procedures described in Section 3.1.1. However, there is no specific guidance from Region III on the procedures to be adopted for deriving RBCs for ground water that is not anticipated to be, nor has historically been, used for beneficial purposes. Since direct contact with ground water is not considered a viable exposure pathway; any concerns relating to ground water focus on potential exposure to ecological receptors present in the Kanawha River adjacent to the Site. The following four step process will be utilized to identify constituents of interest in ground water for the human health and ecological risk assessment:

- Since a formal data quality review has not been performed, all data will be assumed valid and included in further evaluations. The inclusion of all available data in the risk assessment is the most conservative approach outlined in Agency guidance. Additionally, for non-detects where the detection limit exceeded permit specified limits, assumed concentrations will be developed consistent with Agency guidance. When screening chemicals for further evaluation maximum analytical values will be compared to permit levels to eliminate constituents that are within the specified limits.

- For constituents in ground water that exceed the assigned permit level, maximum concentration data will be used to estimate a conservative "worst-case" flux to the Kanawha River and a range of dilutions based on mixing volumes and river flow parameters. Estimated surface water concentrations derived from these calculations will be compared with toxicity factors for aquatic species to screen out constituents which would have no effect on the overall risk estimates for the site. For this part of the ecological evaluation, if screening values are not identified, appropriate ecological screening criteria will be developed consistent with available USEPA guidance for conducting ecological assessments at Superfund sites.

- Based on site-specific factors and previous comments provided by USEPA to Monsanto, consideration will be given to including constituents into the risk assessment that had been eliminated by the procedures described above. Specific attention will be given to constituents with elevated detection limits which exceed ground-water permit levels.

- Background information for constituents of interest, when available, will be evaluated to provide a basis for screening from quantitative analysis constituents that are clearly not related to activities at the Site, even if they exceed the screening criteria for ground water described above.

The rationale for retaining or eliminating constituents identified in ground water during each step of the selection process will be documented in the risk assessment. The risk assessment will present quantitative estimates of risk for selected constituents of interest for each complete exposure pathway identified in the conceptual site model (described in Section 3.2).

3.2 Conceptual Site Model for Potential Exposure Pathways

To build a foundation for the risk assessment, a conceptual site model to evaluate potential exposure pathways has been developed (Attachment A - Figure 2). Residual sources and release/transport mechanisms were evaluated to preliminarily identify relevant receiving media. Potential receptors and exposure pathways were reviewed to provide a basis for conducting a human health and ecological exposure assessment for the proposed risk evaluation. The rationale for selection of exposure pathways and receptors is summarized in Table 1 through Table 6 of Attachment A.

Current off-site residential exposures and future on-site residential exposures were evaluated as part of the exposure scenario analysis. However, the Site continues to be an operating industrial facility, thus, residential exposures were deemed to be highly improbable and were not considered relevant for inclusion in the quantitative analysis of risk. Exposure scenarios for which there appears to be reasonable justification for more detailed consideration include occupational, construction and visitor/trespassing exposure scenarios. Recreational use of the Kanawha River is included as part of the off-site residential exposure scenario. The Site is unlikely to contain significant terrestrial ecological habitat, thus, the potential for terrestrial

ecological impact will not be considered in detail in the ecological evaluation. The adjacent Kanawha River, alternately does have aquatic habitat where the potential for ecological impact resulting from discharge of ground water will be considered in the ecological evaluation.

3.3 Development of Site-Specific Risk-Based Action Levels (RBALs)

Site-specific RBALs are used to define the need for, and extent of, stabilization/corrective measures for different environmental media at a site. To develop site-specific RBALs for the Monsanto, Nitro, West Virginia Site the approach that will be adopted will be to clearly define which constituents identified in soil and ground water could result in an unacceptable level of risk to human and/or ecological receptors.

Risk Assessment Guidance for Superfund, Human Health Evaluation Manual, Part B (USEPA, 1991) describes a methodology for developing RBALs (characterized as risk-based preliminary remediation goals or PRGs by the Agency) for land used for commercial/industrial purposes. The procedures to be used to derive RBALs for stabilization/corrective action program at the Site will adopt the principles described in RAGs Part B, as described by the following:

- Estimated risks to human and ecological receptors will be evaluated using the exposure scenarios and exposure pathways defined by the conceptual model. Site-specific RBALs will be derived for constituents and pathways with estimated risks which exceed appropriate regulatory guidelines.

- For human receptors, using site-specific parameters and algorithms specifically adapted to include results from the risk assessment RBALs will be calculated for each constituent and pathway associated with exceedances of appropriate regulatory guidelines.

- For ecological receptors, estimates of ground-water discharge rates that could result in concentrations of constituents that would be of concern to aquatic species will be compared to hypothetical maximal discharge rates. The ecological risk results will be used to establish media-specific RBALs protective of ecological receptors.

- Current concentrations in soils/sediments and ground water will be compared to the site-specific RBALs to define areas requiring stabilization/corrective action measures.

4.0 RESPONSES TO USEPA COMMENTS

Comment:

1. *A number of sampling results detected concentrations above the permit-specified levels, but the conclusion was "no stabilization/corrective measures are currently proposed." If the permit-specified limitation are not met Monsanto is required to include them in the Corrective Measures Workplan. Stabilizations, corrective measures or a risk assessment should be initiated for all units where sampling results show exceedances of the limitation specified in the Corrective Action Permit.*

Response #1:

Monsanto understands and acknowledges that a risk assessment, stabilizations, or corrective measures will be required to address all units where sampling results indicate exceedances of permit-specified levels. The RFI prioritized addressing ground water primary areas of concern via a preliminary risk evaluation and proposed stabilization/corrective measures for sewers. Monsanto will also address all soil exceedances as part of the upcoming risk evaluation activities. Stabilization/corrective measures for soils and ground water will be proposed, as warranted, based upon the results of the site-specific risk evaluation. The technology selected will be based on an evaluation of engineering feasibility, as previously described in Section 8.0 of the RFI/SCMP.

Comment:

2. *Due to the dilution of a number of samples the minimum detection limit was greater than the permit-specified limitation. The majority of the times the detection limit was a number of times the permit-specified limits. These results should be reviewed as exceedances of the permit levels.*

Response #2:

At present, Monsanto acknowledges the requirement to address any sample results with method detection limits that were greater than the permit-specified level for individual constituents as "exceedances". Monsanto will use a site-specific risk evaluation approach to determine need for stabilization/corrective measures. Assumed concentration values for non-detects (zero, one-half the detection limit, or the detection limit) will be developed in cooperation with the USEPA. If necessary, Monsanto will pursue additional sampling in select locations to refine actual constituent concentrations.

It should be noted that many of the sample dilutions in question are the result of elevated dissolved-phase concentrations of the predominant constituents of concern (trichloroethene, benzene, and chlorinated phenols). Monsanto identified these elevated ground-water concentrations in the RFI as primary areas of concern, and proposed that site-specific risk and potential stabilization/corrective measures be further evaluated.

SPECIFIC COMMENTS EXECUTIVE SUMMARY - page v

Comment:

3. *Second paragraph - The report specifies that "Ground-water flow in both the alluvial deposits and bedrock is toward the Kanawha River which represents a major regional discharge boundary." Plate 2 indicates "inferred groundwater flow" towards the river. Is the ground-water flow known or inferred?*

Response #3:

The ground-water flow has been determined to be toward the Kanawha River and the designation on Plate 2 has been changed to delete the term "inferred". A copy of the revised Plate 2 is attached.

Section 2.0 SITE DESCRIPTION

Section 2.4 Description of SWMUs - page 6

Comment:

4. *West Virginia's Office of Waste Management has stated that the RCRA impoundments were not clean closed. The impoundments were stabilized and put back in place. There should be ground-water monitoring down gradient of the units to detect contamination migration. Please comment.*

Response #4:

Closure activities for the limestone bed and equalization, surge, and emergency basins at the site were completed in 1986 and 1987. At that time, the facility had interim status under RCRA, and both its filed Part A and Part B permit applications included the limestone bed and equalization, surge, and emergency basins.

Closure activities for interim status facilities are regulated under 40 CFR 265. In 1986, Closure and post-closure care requirements for surface impoundments (SIs) (40 CFR 265.228) included provisions that an SI was no longer subject to 40 CFR 265, if no hazardous wastes remained. Monsanto demonstrated by sampling and pH analyses that the liquid, sludge, and underlying soil in the emergency basin did not exhibit the characteristic of corrosivity (Attachment B), and were therefore no longer subject to the requirements of 40 CFR 265.

In 1986, the ground water monitoring requirements of 40 CFR 265.90 were waived for any SI that was used to neutralize wastes solely because they exhibit the corrosivity characteristic and contain no other hazardous wastes. Monsanto, in written correspondence to the West Virginia Department of Water Resources dated November 4, 1985, stated that no listed hazardous wastes were disposed at the plant's Wastewater Treatment Plant (Attachment C). As the SIs were used solely to neutralize characteristically corrosive hazardous wastes, the ground water requirements of 265.90 were waived. As a result, the surface impoundments met the requirements of a "clean closure" and available documentation regarding the required professional engineers' certifications are enclosed (Attachment D).

Monsanto is, however, committed to performing appropriate site-wide ground-water monitoring as part of the Corrective Action Permit.

Section 5.0 EVALUATION OF ANALYTICAL DATA QUALITY - page 25

Comment:

5. *First paragraph - Be specific about the problems that were encountered in the analysis of the samples.*

Response #5:

Specific information on problems encountered in the analyses of samples was provided in Appendix D of the RFI/SCMP. Please refer to Appendix D of the RFI/SCMP for suitable discussions.

Section 6.0 OVERVIEW OF RFI ANALYTICAL RESULTS

Section 6.1 Soil Analytical Results - page 28

Comment:

6. *The concentrations listed in the table have not been approved by EPA. In fact, some of the typical urban concentrations listed are almost 100 times the limits EPA set to protect human health and the environment. This table should not be included in the report. The report should contain only factual information.*

Response #6:

Monsanto provided the table of typical values of soil concentrations to introduce the appropriateness of using a site-specific risk evaluation for commonly occurring constituents. The values included in the table are factual, although perhaps not site-specific. In future reports, Monsanto will cite only defendable site-specific risk-based levels as part of the mutually agreeable risk assessment approach for evaluating potential stabilization/corrective measures. Further details of the proposed risk approach are provided in Section 3.0 of the RFI/SCMP Addendum.

Comment:

7. *First paragraph - Some soil samples [were] found very high concentration of detected analytes for VOCs and BN/AE Compounds at Building 46 (e.g. Benzo (a) pyrene and Benzo (b) fluoranthene - 40 and 30 times the permit level, respectively). Therefore, soils at Building 46 should be included in the Corrective Measures Plan.*

8. *First paragraph - Some soil samples [were] found very high concentration of regulated compounds at the riverbank (e.g. Benzo (b) fluoranthene and Benzo (a) pyrene - 12 and 9 times the permit level, respectively). Therefore, soils at the riverbank should be included in the Corrective Measures Plan.*

Response #7 and #8:

Monsanto will address all soils with exceedances of permit-specified levels as part of the upcoming site-specific risk evaluation. Potential stabilization/corrective measures will be developed, as warranted, based on the results of the risk evaluation. These evaluations will be performed as part of the upcoming Stabilization/Corrective Measures Plan activities, and results will be presented in a summary report as described in Section 8.3 of the RFI/SCMP.

Comment:

9. *Second paragraph - Typical background levels of metals are not acceptable, they do not protect human health and the environment. The limitation in the permit must be met. Arsenic levels at Building 46 were 7 times the permit level and beryllium levels were 6 times the permit level. Arsenic levels at the riverbank were 17 times the permit level and beryllium levels were 5 times the permit level. Therefore, soils at Building 46 and the riverbank should be included in the Corrective Measures Plan. Background data collection is an option in the Corrective Measures Plan.*

Comment:

10. *Second paragraph - Sediment samples documented arsenic levels to be 16 times the permit level and beryllium levels to be 3 times the permit level. Therefore, the sediment sample area along the drainage swale should be included in the Corrective Measures Plan.*

Response #9 and #10:

As indicated in the RFI, the observed concentrations and distribution of the arsenic and beryllium data suggest that background levels may exceed the permit-specified level. Monsanto will utilize a tiered approach to resolving potential background issues. First, Monsanto will include all constituents which exceed permit-specified levels in the site-specific risk evaluation. If the risk-based concentrations indicate that potential background levels need to be further supported, then Monsanto will initiate the following background evaluation. Existing regional analytical data from industrial facilities in the Kanawha River Valley will be compiled for the constituents of interest. A review of production records will then be performed to identify if compounds were formerly used at the facility. Finally, as necessary, Monsanto will collect site-specific background data to support the identification of constituents of interest as was outlined in Section 3.1 of this Addendum.

Section 6.4 Ground-Water Analytical Results - page 30

Comment:

11. *First paragraph - Ground-water samples documented concentrations of metals above the permit-specified levels (e.g. cadmium and arsenic - 8 and 5 times the permit level, respectively). Therefore, metals in the ground-water should be included in the Corrective Measures Plan.*

Response #11:

As previously indicated, Monsanto will address, via a risk evaluation, all constituent concentrations in ground water which exceeded permit-specified levels. Should resampling of select monitoring wells which indicated metal exceedances be pursued, Monsanto will use low flow peristaltic pumps to reduce the potential for artifacts resulting from physical disturbance and aqueous suspension of particulates.

Section 6.5 Identification of Primary Areas of Concern - page 31

Comment:

12. *Second and third paragraph - It appears that the approach to identify the horizontal extent of the primary areas of concern for ground-water is a risk assessment. If so, this assessment should be performed in the Corrective Measures stage.*

    Also the areas of concern should be based on exceedances of the permit-specified levels, not 1000 µg/ℓ. At this level there could still be a risk to human health or the environment for a certain chemical.

Response #12:

The approach presented in the RFI/SCMP was a preliminary risk approach and was utilized for identifying primary areas of concern in site ground water. Monsanto will perform a more comprehensive analysis and present the results as part of the risk evaluation and Stabilization/Corrective Measures Plan activities.

Section 7.0 SUMMARY OF RESULTS BY INDIVIDUAL SWMU

Section 7.1 Building 46 Incinerator Soil sampling - page 32 & 33

Comment:

13. *Page 32, first paragraph - Tetrachloroethene, not PCE, was the only VOC detected above the permit-specified level. Four samples showed exceedances as much as 6½ times the permit-specified levels. See comment 7.*

Response #13:

Tetrachloroethene was the only VOC detected above the permit-specified levels. In the RFI, the compound was abbreviated as PCE, to reflect the synonym chemical name, perchloroethene. As for addressing the exceedance issue, please see the Response to Comment #14 below.

14. *Page 32, second paragraph - Five BN/AE compounds were detected above permit-specified levels in five different samples. Benzo (a) pyrene, the most carcinogenic compound, showed exceedances as much as 40 times the permit-specified levels. See comment 7.*

Response #14:

Monsanto will address all soils with exceedances of permit-specified levels as part of the upcoming site-specific risk evaluation. Potential stabilization/corrective measures will be developed, as warranted, based on the results of the risk evaluation.

Comment:

15. *Page 33, first paragraph - Arsenic and beryllium were detected above permit-specified levels in three different samples as much as seven times the permit-specified levels. See comment 7.*

Response #15:

See Response to Comment #9 and #10.

Section 7.2 Riverbank Soil Sampling - page 33 & 34

Comment:

16. *Page 33, last paragraph - Due to dilution, sample RB-2's detection limit was greater than the permit-specified level, therefore it must be assumed that this sample exceeds the permit-specified level. See comment 2. Therefore, all three samples showed exceedances of the permit-specified levels by as much as twelve times. See comment 8.*

Response #16:

At present, Monsanto acknowledges the requirement to address any sample results with method detection limits that were greater than the permit-specified level for individual constituents as "exceedances". Monsanto will use a site-specific risk evaluation approach to determine need for stabilization/corrective measures. Assumed concentration values for non-detects (zero, one-half the detection limit, or the detection limit) will be developed in cooperation with the USEPA. If necessary, Monsanto will pursue additional sampling in select locations to refine actual constituent concentrations.

It should be noted that many of the sample dilutions in question are the result of elevated dissolved-phase concentrations of the predominant constituents of concern (trichloroethene, benzene, and chlorinated phenols). Monsanto identified these elevated ground-water concentrations in the RFI as primary areas of concern, and proposed that site-specific risk and potential stabilization/corrective measures be further evaluated.

Comment:

17. *Page 34, second paragraph - Arsenic and beryllium are naturally occurring compounds but no background samples were taken at the facility. Also there was no mention of whether or not the Monsanto facility ever used, or produced, these compounds. The three samples showed exceedances of up to 17 times the permit-specified levels. See comment 9.*

Response #17:

As indicated in the RFI/SCMP, the observed concentrations and distribution of the arsenic and beryllium will be addressed in the risk evaluations for further discussion, see Response to Comment #9.

Section 7.3 Sediment Sampling - page 34

Comment:

18. *Second paragraph - The comment that Bis (2-ethylhexyl) phthalate is commonly found as a contaminant in the sampling and analysis process is not an acceptable reason to disregard the sample. Could other sampling methods been used? Additional sampling may be required.*

Response #18:

The sediment sample in which bis (2-ethylhexyl) phthalate was detected will be addressed as part of the upcoming site-specific risk evaluation. Appropriate measures will be proposed (i.e., stabilization or resampling) based on the results of the risk evaluation.

Comment:

19. *Third paragraph - Metals exceeded the permit-specified levels by as much as sixteen times. See comment 10.*

Response #19:

As indicated in the RFI/SCMP, the observed concentrations and distribution of the arsenic and beryllium will be addressed in the risk evaluations for further discussion, see Response to Comment #9.

Section 7.6 Ground-Water Sampling Results

Section 7.6.2 Chlorinated Methane Compounds - page 38

Comment:

20. *Chloroform was detected as much as thirteen times the permit-specified level. Therefore, stabilization/corrective measures are required for chloroform in the ground-water.*

Response #20:

As previously indicated, Monsanto will address constituent concentrations in ground-water which exceeded permit-specified levels in the risk evaluation.

Section 7.6.9 Metals - page 42

Comment:

21. *A number of samples had minimum detection limits which are greater than the permit-specified level, therefore it is assumed that exceedances occurred for those samples. See comment 2.*

    Also some metals were detected as much as seven times the permit-specified levels, not 1000 µg/ℓ. Discuss the differences using exceedances in lieu of 1000 µg/ℓ. See comment 12.

Response #21:

See Response to Comment #16.

Section 8.0 EVALUATION OF POTENTIAL STABILIZATION/CORRECTIVE MEASURES

Section 8.1 Evaluation of the Need for Potential Stabilization/Corrective Measures

Comment:

22. *The areas of concern should be based on exceedances of the permit-specified levels, not 1000 µg/ℓ. Discuss the differences using exceedances in lieu of 1000 µg/ℓ. See comment 12.*

Response #22:

See Response to Comments #12 and #16.

Section 8.2 Evaluation of the Scope of Potential Stabilization/Corrective Measures - page 45

Comment:

23. *A number of units and/or chemical of concerns should be addressed in this Section. If there are exceedances of the permit-specified levels the unit should be addressed in the Corrective Measures Plan. See Comment 1.*

Response #23:

Monsanto understands and acknowledges that stabilizations, corrective measures or a risk assessment will be required to address all units where sampling results indicate exceedances of permit-specified levels. The RFI prioritized addressing ground-water primary areas of concern via a preliminary risk evaluation and proposed stabilization/corrective measures for sewers. Monsanto will also address all soil exceedances as part of the upcoming risk evaluation activities. Stabilization/corrective measures for soils and ground water will be proposed, as warranted, based upon the results of the site-specific risk evaluation. If stabilization/corrective measures are warranted, the technology selected will be based on an evaluation of engineering feasibility, as previously described in Section 8.0 of the RFI/SCMP.

FIGURE 4 CROSS SECTION A - A'

Comment:

24. *Monitoring well MW-17A should have been screened up to the water table, possible extensions of benzene could have been detected. Please explain.*

Response #24:

As monitoring well MW-17A was installed in 1985, screen placement was not selected as part of the RFI/SCMP sampling program. A review of the top of screen, and ground-water, elevation data indicates that the screen interval for MW-17A is approximately 10 to 12 feet below the water table. However, it is believed that the ground-water analytical data for MW-17A are still representative of actual shallow ground-water quality for the following reasons. While shallow monitoring wells that do not bridge the water table have limitations in detecting the presence of light non-aqueous phase liquids (LNAPLs), they are adequate for measuring representative dissolved phase concentrations. This is primarily a result of the well purging procedures which lower the ground-water elevations several feet prior to ground-water sample collection. In addition, two of the most commonly detected constituents in site ground water, benzene and TCE, have relatively high solubility limits (1,750 mg/ℓ and 1,100 mg/ℓ, respectively), yet neither constituent was detected in MW-17A at a quantitation limit of 0.005 mg/ℓ. It is implausible to suspect that the proximity of the top of screen to the ground-water surface for this monitoring well, is masking significantly elevated dissolved-phase constituent concentrations.

FIGURE 4 CROSS SECTION A - A'

Comment:

25. *Figure 4 shows monitoring well MW-1A screened several feet below the water table. Plate 6 shows the well being screened at the water table. Please correct the discrepancy.*

FIGURE 5 CROSS SECTION B - B'

Comment:

26. *Figure 5 shows monitoring well 20-A screened several feet below the water table. Plate 6 shows the well being screened at the water table. Please correct the discrepancy.*

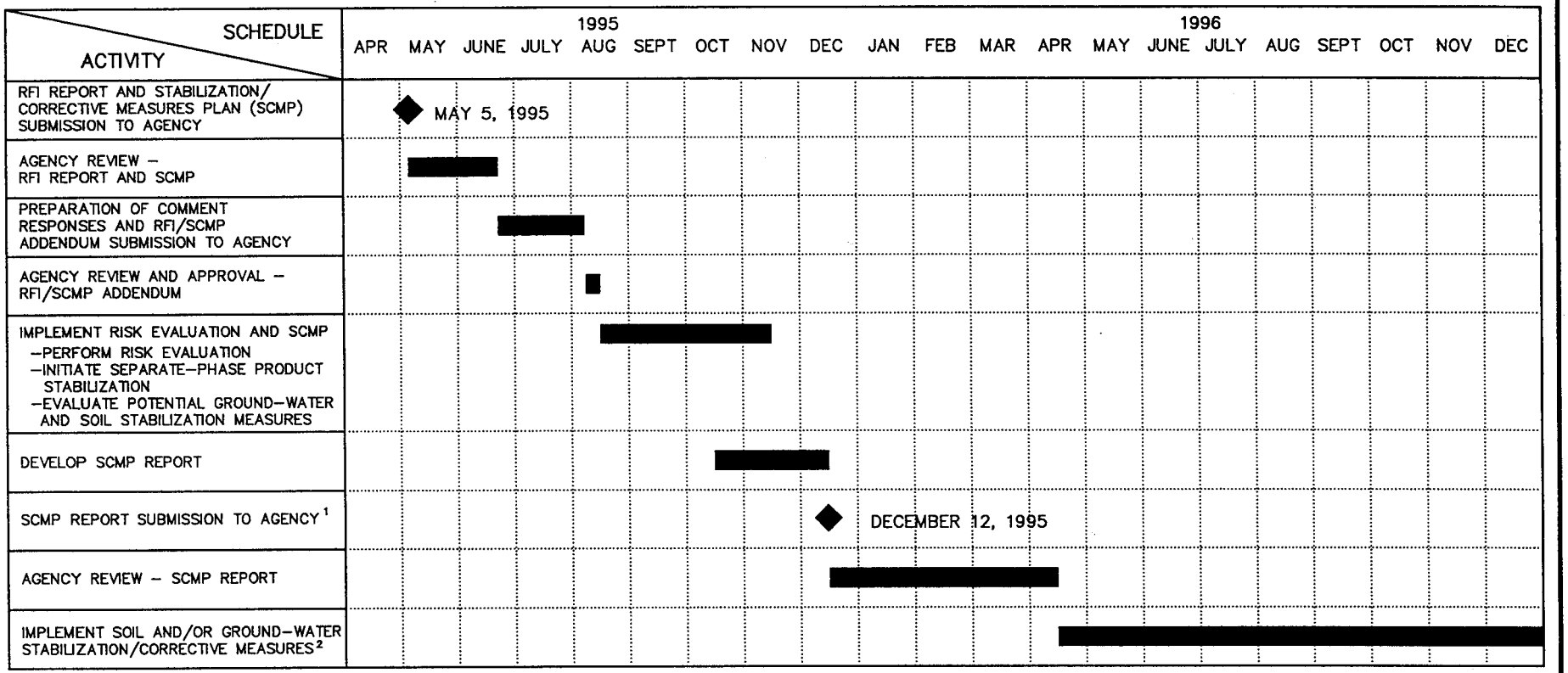
Response #25 and #26:

Plate 6 has been revised to show proper well screen locations and is now in agreement with Figures 4 and 5. The revised Plate 6 is attached.

5.0 UPDATED PROJECT SCHEDULE

The proposed separate-phase product recovery stabilization measures, risk evaluations, and evaluations of potential ground-water and soil stabilization/corrective measures will be initiated by Monsanto as indicated in the proposed project schedule (Figure 8). This RFI/SCMP figure has been updated to reflect actual agency review periods for the original RFI/SCMP submittal.

FIGURES



LEGEND

PROJECT ACTIVITY SCHEDULE

PROPOSED MILESTONE

NOTES:

[1] ADDITIONAL TIME FOR REPORT SUBMISSION MAY BE NECESSARY DEPENDING UPON APPROVED SCOPE OF WORK.

[2] THE NEED FOR AND SCOPE OF POTENTIAL SOIL AND/OR GROUND–WATER STABILIZATION/CORRECTIVE MEASURES WILL BE REFINED DURING THE SITE–SPECIFIC RISK EVALUATION PROCESS. THE DURATION OF POTENTIAL STABILIZATION MEASURES CANNOT BE DETERMINED AT THIS TIME.

Title:

PROPOSED PROJECT SCHEDULE (REVISED)

NITRO, WEST VIRGINIA

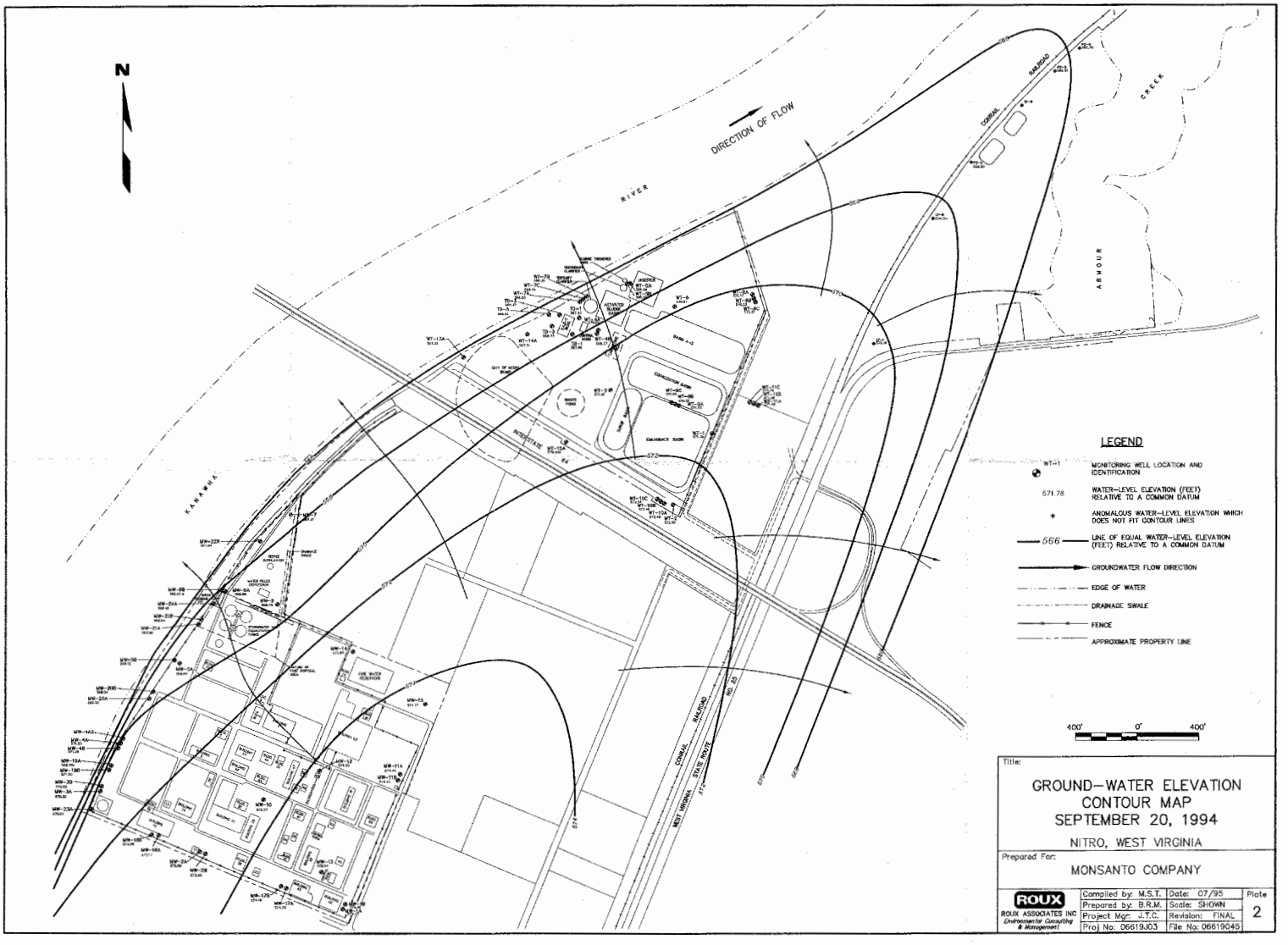
Prepared For:

MONSANTO COMPANY

ROUX ASSOCIATES INC
Environmental Consulting & Management

Compiled by: P.J.H.	Date: 08/95	Figure 8
Prepared by: W.A.R.	Scale: NONE	
Project Mgr: J.T.C.	Revision: FINAL	
Proj No: 06619J03	File No: 06619052	

PLATES



Title:

GROUND-WATER ELEVATION CONTOUR MAP SEPTEMBER 20, 1994

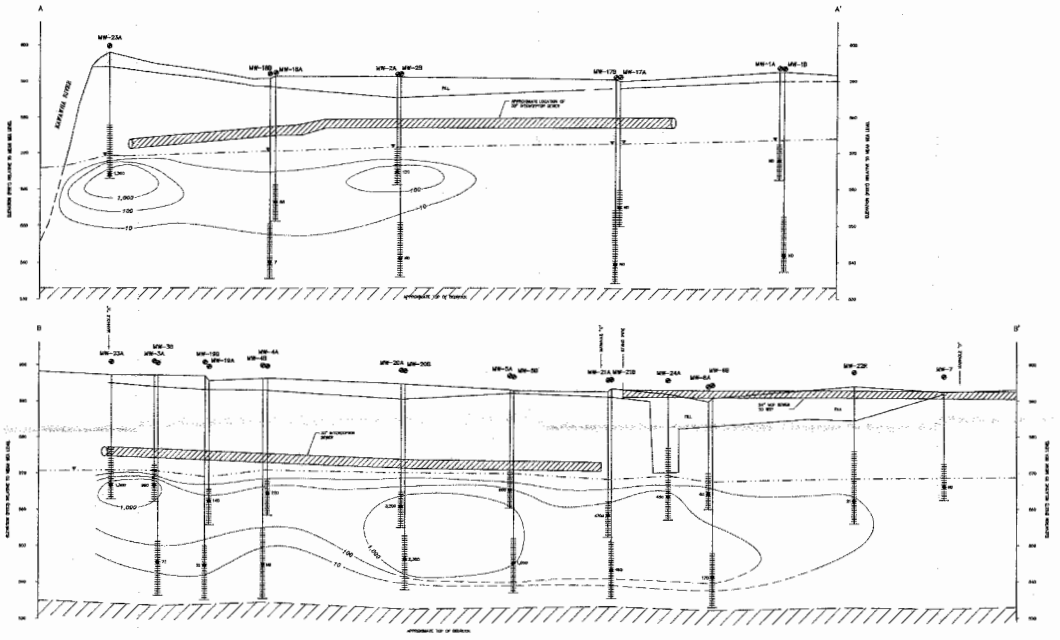
NITRO, WEST VIRGINIA

Prepared For:

MONSANTO COMPANY

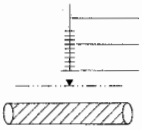
ROUX ASSOCIATES INC
Environmental Consulting & Management

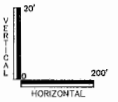
Compiled by: M.S.T.	Date: 07/95	Plate
Prepared by: B.R.M.	Scale: SHOWN	2
Project Mgr: J.T.C.	Revision: FINAL	
Proj. No: 06619J03	File No: 06619045	



LEGEND

MW-1A	MONITORING WELL LOCATION AND IDENTIFICATION
120	TCE CONCENTRATION ($\mu g/l$) PLACED AT MID-POINT OF WELL SCREEN BELOW WATER-TABLE ELEVATION
ND	NOT DETECTED
1,000	LINE OF EQUAL TCE CONCENTRATION IN GROUND WATER ($\mu g/l$) (DASHED WHERE INFERRED)
	BEDROCK





NOTES:

1. REFERENCE PLATE 5 FOR LOCATIONS OF CROSS-SECTIONS A-A' AND B-B'.

Title:

CROSS-SECTIONS SHOWING VERTICAL DISTRIBUTION OF TCE IN GROUND WATER

NITRO, WEST VIRGINIA

Prepared For:

MONSANTO COMPANY

ROUX ASSOCIATES INC
Environmental Consulting & Management

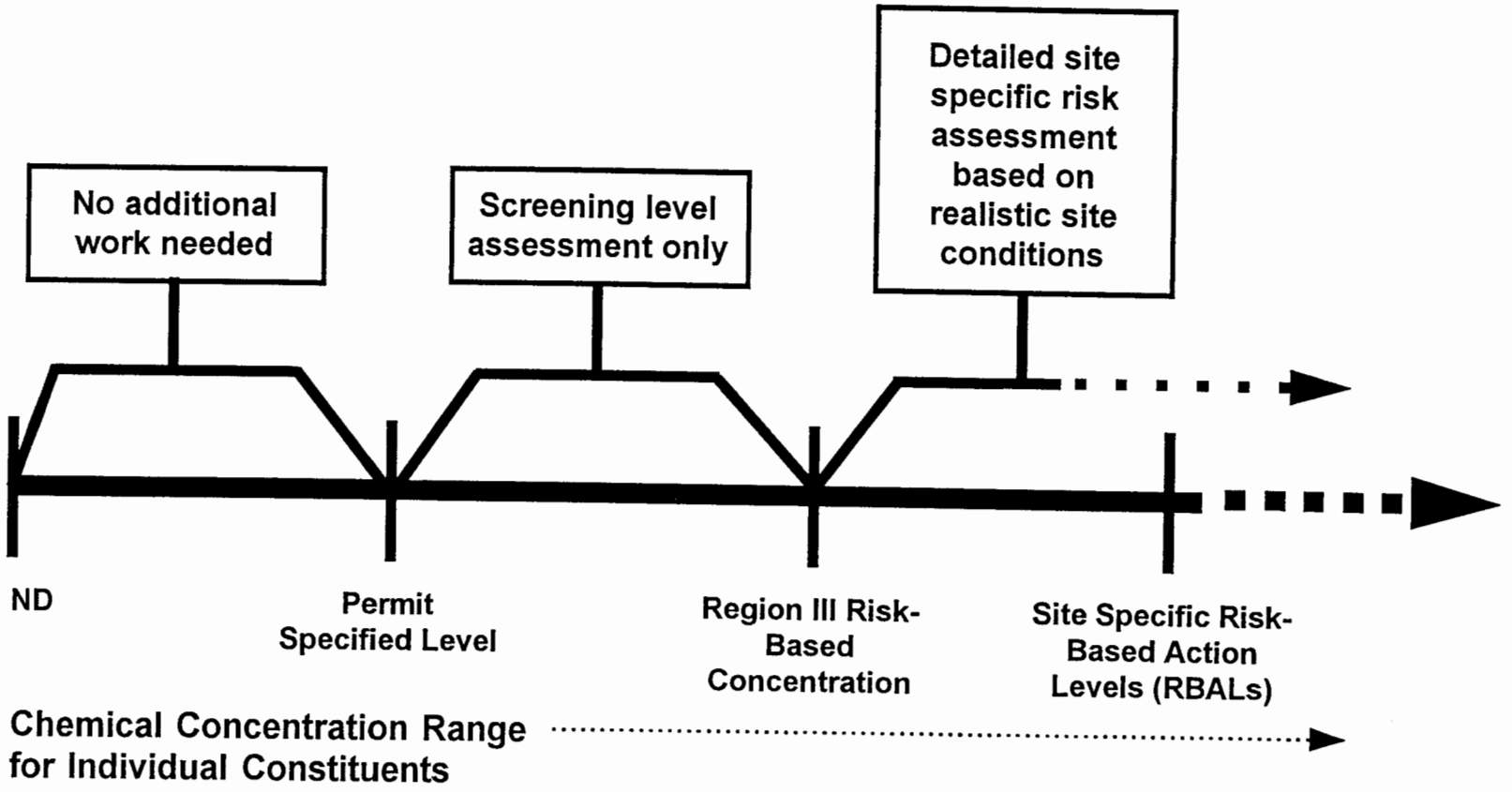
Compiled by: S.E.A.	Date: 07/95	Plate
Prepared by: M.J.V.	Scale: SHOWN	6
Project Mgr: J.T.C.	Revision: FINAL	
Proj No: 06619J03	File No: 06619045	

ATTACHMENTS

ATTACHMENT A

SUPPORTING RISK EVALUATION APPROACH TABLE AND FIGURES

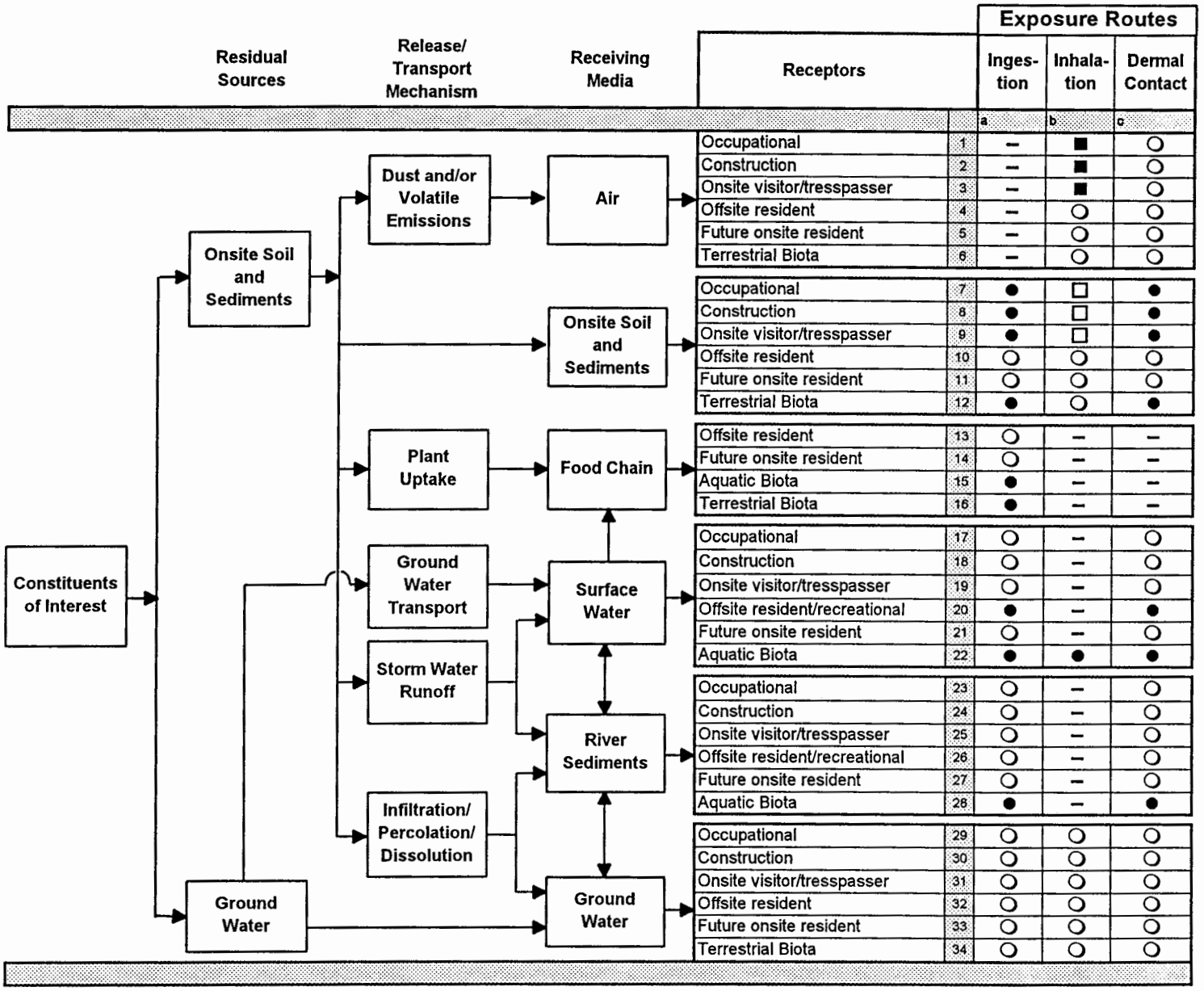
Figure 1: Model to Illustrate the Approach for Defining Constituents of Interest at the Monsanto, Nitro, West Virginia Site



Attachment A

06619J03g\1\chemintr.ppt

Figure 2: Conceptual Model to Evaluate Potential Exposure Pathways at the Monsanto, Nitro, West Virginia Site



Notes

Justification for selection of relevant exposure pathways is provided in following tables

- ● = Pathway complete, further evaluation recommended
- ■ = Receiving media/release mechanism dependent, further evaluation recommended
- ○ = Pathway evaluated and found incomplete and/or insignificant, no further evaluation recommended
- □ = Potential exposure evaluated in the air exposure pathway.
- – = Not a relevant exposure pathway

Table 1: Analysis of Potential Exposure Pathways for the Onsite Occupational Exposure Scenarios for Current Use of the Monsanto, Nitro, West Virginia Site

Receiving Media/ Release Mechanism	Receptor	Exposure Route	Pathway to be Evaluated[1]	Reason for Inclusion or Exclusion	Reference to Conceptual Model
Ambient Air					
Fugitive dust/wind erosion from surface soil and onsite sediments	Adult	Inhalation	Yes	Surface soils and sediments may be exposed/disturbed resulting in dust generation.	1b
Volatilization from surface soil[2]	Adult	Inhalation	Yes	Chemicals may volatilize from surface soils and sediments at Site.	1b
Volatilization from subsurface soil[3]	Adult	Inhalation	No	Subsurface soils are assumed to not be disturbed during daily occupational use of the Site but are considered in construction scenario.	1b
Volatilization from surface water	Adult	Inhalation	No	River water is not considered a viable source of site-related volatile chemicals.	17b
Onsite Soils and Sediments					
Surface soils[2] - direct contact	Adult	Incidental ingestion Dermal absorption	Yes Yes	Surface soils and drainage swale sediments may be contacted by employees during regular/routine Site operations.	7a 7c
Subsurface soils[3] - direct contact	Adult	Incidental ingestion Dermal absorption	No No	Subsurface soils are assumed to not be disturbed during occupational use of the Site but are considered in the construction scenario.	7a 7c
Surface Water					
Direct contact	Adult	Incidental ingestion Dermal absorption	No No	River water is not expected to be contacted by employees during regular/ routine Site operations.	17a 17c
River Sediments					
Direct contact	Adult	Incidental ingestion Dermal absorption	No No	River sediments are not accessible for contact by employees during regular/routine Site operations.	23a 23c
Ground Water					
Direct contact	Adult	Ingestion Inhalation Dermal absorption	No No No	Incomplete pathway: ground water is not utilized for any purpose at the Site.	29a 29b 29c

[1] If constituents of interest are present in receiving media.
[2] Surface soils are defined as 0-2 foot interval and sediments from the drainage swale.
[3] Subsurface soils are defined as 0-4 foot interval.

Table 2: Analysis of Potential Future Exposure Pathways for the Onsite Construction Exposure Scenario at the Monsanto, Nitro, West Virginia Site

Receiving Media/ Release Mechanism	Receptor	Exposure Route	Pathway to be Evaluated[1]	Reason for Inclusion or Exclusion	Reference to Conceptual Model
Ambient Air					
Fugitive dust/wind erosion from subsurface soil and onsite sediment	Adult	Inhalation	Yes	Subsurface soils may be exposed/disturbed during excavation resulting in dust generation.	2b
Volatilization from surface/subsurface soil[2, 3]	Adult	Inhalation	Yes	Chemicals may volatilize from surface/subsurface soils and sediments at Site. Surface and subsurface soils may be exposed/mixed during excavation resulting in release of volatile chemicals.	2b
Volatilization from surface water	Adult	Inhalation	No	River water is not considered a viable source of site-related volatile chemicals.	18b
Onsite Soils and Sediments					
Surface/subsurface soils[2, 3] - direct contact	Adult	Incidental ingestion Dermal absorption	Yes Yes	Chemicals detected in surface soils and sediments are included with chemicals detected in subsurface soils since subsurface soils encompass surface soils. Subsurface soils may be exposed and contacted during construction.	8a 8c
Surface Water					
Direct contact	Adult	Incidental ingestion Dermal absorption	No No	River water is not expected to be contacted during onsite construction activities.	18a 18c
River Sediments					
Direct contact	Adult	Incidental ingestion Dermal absorption	No No	River sediments are not accessible for contact during onsite construction activities.	24a 24c
Ground Water					
Direct contact	Adult	Ingestion Inhalation Dermal absorption	No No No	Incomplete pathway: ground water is not utilized for any purpose at the Site and is too deep (≈20 ft. BGS) for contact during routine construction.	30a 30b 30c

[1] If constituents of interest are present in receiving media.
[2] Surface soils are defined as 0-2 foot interval and sediments from drainage swale.
[3] Subsurface soils are defined as 0-4 foot interval.

Table 3: Analysis of Potential Exposure Pathways for the Onsite Visitor/Trespasser Exposure Scenario for Current Use of the Monsanto, Nitro, West Virginia Site

Receiving Media/ Release Mechanism	Receptor	Exposure Route	Pathway to be Evaluated[1]	Reason for Inclusion or Exclusion	Reference to Conceptual Model
Ambient Air					
Fugitive dust/wind erosion from surface soil and onsite sediments	Adult[2]	Inhalation	Yes	Surface soils and sediments may be exposed/disturbed resulting in dust generation.	3b
Volatilization from surface soil[3]	Adult[2]	Inhalation	Yes	Chemicals may volatilize from surface soils and sediments at Site.	3b
Volatilization from subsurface soil[4]	Adult[2]	Inhalation	No	Subsurface soils are assumed to not be routinely disturbed, thus, receptors other than construction workers are unlikely to be exposed.	3b
Volatilization from surface water	Adult[2]	Inhalation	No	River water is not considered a viable source of site-related volatile chemicals.	19b
Onsite Soils and Sediments					
Surface soils[3] - direct contact	Adult[2]	Incidental ingestion Dermal absorption	Yes Yes	Direct contact with soils and sediments may occur during onsite activities.	9a 9c
Subsurface soils[4] - direct contact	Adult[2]	Incidental ingestion Dermal absorption	No No	Subsurface soils are assumed to not be disturbed/contacted during visits to the Site.	9a 9c
Surface Water					
Direct contact	Adult[2]	Incidental ingestion Dermal absorption	No No	River water is unlikely to be contacted by persons visiting the Site.	19a 19c
River Sediments					
Direct contact	Adult[2]	Incidental ingestion Dermal absorption	No No	River sediments are not accessible for contact by persons visiting the Site.	25a 25c
Ground Water					
Direct contact	Adult[2]	Ingestion Inhalation Dermal absorption	No No No	Incomplete pathway: ground water is not utilized for any purpose at the Site.	31a 31b 31c

[1] If constituents of interest are present in receiving media.
[2] Due to institutional controls, trespassing by youths considered unlikely.
[3] Surface soils are defined as 0-2 foot interval and sediments from the drainage swale.
[4] Subsurface soils are defined as 0-4 foot interval.

Table 4: Analysis of Potential Exposure Pathways for Current Offsite Residential Exposure Scenarios at the Monsanto, Nitro, West Virginia Site

Receiving Media/ Release Mechanism	Receptor	Exposure Route	Pathway to be Evaluated[1]	Reason for Inclusion or Exclusion	Reference to Conceptual Model
Ambient Air					
Fugitive dust/wind erosion from surface soil and onsite sediments	Adult/Child	Inhalation	No	Not a relevant pathway for local residents. Residential areas are not in close proximity to site. Any visits to the Site are addressed in the onsite visitor/trespasser scenario. Local residents working at the Site are addressed in the occupational exposure scenario.	4b
Volatilization from surface soil[2]	Adult/Child	Inhalation	No	Not a relevant pathway for local residents. Residential areas are not in close proximity to site. Any visits to the Site are addressed in the onsite visitor/trespasser scenario. Local residents working at the Site are addressed in the occupational exposure scenario.	4b
Volatilization from subsurface soil[3]	Adult/Child	Inhalation	No	Not a relevant pathway for local residents. Disturbed areas are anticipated to be so small that there will be insignificant offsite impacts.	4b
Volatilization from surface water	Adult/Child	Inhalation	No	River water is not considered a viable source of site-related volatile chemicals.	20b
Onsite Soils and Sediments					
Surface/subsurface soils[2, 3] - direct contact	Adult/Child	Incidental ingestion Dermal absorption	No No	Not a relevant pathway for local residents. Significant transfer of onsite dust to offsite locations will not occur.	10a 10c
Food Chain					
Ingestion of homegrown produce	Adult/Child	Ingestion	No	No relevant release mechanisms for onsite soils to impact offsite garden soils.	13a
Surface Water					
Direct contact	Adult/Child	Incidental ingestion Dermal absorption	Yes Yes	Contact with river water may occur as a result of recreational activities that could include fishing, boating or swimming.	20a 20c
River Sediments					
Direct contact	Adult/Child	Incidental ingestion Dermal absorption	No No	No contact with river sediments anticipated based on inaccessability	26a 26c
Ground Water					
Direct contact	Adult/Child	Ingestion Inhalation Dermal absorption	No No No	Ground water from the Site is not utilized for any purpose. Onsite ground water flow is in the opposite direction from residential areas, and discharges to surface water.	32a 32b 32c

[1] If constituents of interest are present in receiving media.
[2] Surface soils are defined as 0-2 foot interval and sediments from the drainage swale.
[3] Subsurface soils are defined as 0-4 foot interval.

Table 5: Analysis of Potential Exposure Pathways for the Future Onsite Residential Exposure Scenario at the Monsanto, Nitro, West Virginia Site

Receiving Media/ Release Mechanism	Receptor	Exposure Route	Pathway to be Evaluated[1]	Reason for Inclusion or Exclusion	Reference to Conceptual Model
Ambient Air					
Fugitive dust/wind erosion from surface soil and onsite sediments	Adult/Child	Inhalation	No	Site will remain industrial for the foreseeable future - no onsite residential exposure anticipated.	5b
Volatilization from surface/subsurface soil[2, 3]	Adult/Child	Inhalation	No	Site will remain industrial for the foreseeable future - no onsite residential exposure anticipated.	5b
Volatilization from surface water	Adult/Child	Inhalation	No	Site will remain industrial for the foreseeable future - no onsite residential exposure anticipated.	21b
Onsite Soils and Sediments					
Surface/subsurface soils[2, 3] - direct contact	Adult/Child	Incidental ingestion Dermal absorption	No No	Site will remain industrial for the foreseeable future - no onsite residential exposure anticipated.	11a 11c
Food Chain					
Ingestion of homegrown produce	Adult/Child	Ingestion	No	Site will remain industrial for the foreseeable future - no onsite residential exposure from ingestion of onsite garden produce	14a
Surface Water					
Direct contact	Adult/Child	Incidental ingestion Dermal absorption	No No	Site will remain industrial for the foreseeable future - no onsite residential exposure anticipated.	21a 21c
River Sediments					
Direct contact	Adult/Child	Incidental ingestion Dermal absorption	No No	Site will remain industrial for the foreseeable future - no onsite residential exposure anticipated.	27a 27c
Ground Water					
Direct contact	Adult/Child	Ingestion Inhalation Dermal absorption	No No No	Site will remain industrial for the foreseeable future - no onsite residential exposure anticipated.	31a 31b 31c

[1] If constituents of interest are present in receiving media.
[2] Surface soils are defined as 0-2 foot interval and sediments from the drainage swale.
[3] Subsurface soils are defined as 0-4 foot interval.

Table 6: Analysis of Potential Exposure Pathways for the Terresterial and Aquatic Biota Exposure Scenarios for Current Use of the Monsanto, Nitro, West Virginia Site

Receiving Media/ Release Mechanism	Receptor	Exposure Route	Pathway to be Evaluated[1]	Reason for Inclusion or Exclusion	Reference to Conceptual Model
Ambient Air					
Fugitive dust/wind erosion from surface soil and onsite sediments	Terresterial animal	Inhalation	No	Unlikely to have significant terrestrial ecosystem component on a primarily industrial site. Pathway not evaluated quantitatively but will be discussed qualitatively.	6b
Volatilization from surface soil[2]	Terresterial animal	Inhalation	No	Unlikely to have significant terrestrial ecosystem component on a primarily industrial site. Pathway not evaluated quantitatively but will be discussed qualitatively.	6b
Volatilization from subsurface soil[3]	Terresterial animal	Inhalation	No	Unlikely that the limited ecosystem on an industrial site will have a significant exposure to volatile constituents.	6b
Volatilization from surface water	Terresterial animal	Inhalation	No	River water is not considered a viable source of site-related volatile chemicals.	6b
Onsite Soils and Sediments					
Surface soils[2] - direct contact	Terresterial animal	Incidental ingestion Dermal absorption	Yes Yes	Surface soils and drainage swale sediments may be contacted by terrestrial animals.	12a 12c
Subsurface soils[3] - direct contact	Terresterial animal	Incidental ingestion Dermal absorption	Yes Yes	Soil organisms and burrowing animals have the potenital to ingest and come into dermal contact with chemical-bearing subsurface soils.	12a 12c
Food Chain					
Food Supply	Terresterial animal Aquatic biota	Ingestion Ingestion	Yes Yes	Chemicals in soils and water may become incorporated into the food chain for terresterial and aquatic organisms.	16a 15a
Surface Water					
Direct contact	Offsite- Aquatic biota	Whole body	Yes	Evaluated for a whole body exposure	22 a,b,c
River Sediments					
Direct contact	Aquatic biota	Whole body	Yes	Evaluated for a whole body exposure.	28 a,b,c
Ground Water					
Direct contact	Terresterial animals	Ingestion Inhalation Dermal absorption	No No No	Ground water is not contacted by any terresterial organisms but will be evaluated for aquatic species as a discharge to surface water.	34a 34b 34c

[1] If constituents of interest are present in receiving media.
[2] Surface soils are defined as 0-2 foot interval and sediments from the drainage swale.
[3] Subsurface soils are defined as 0-4 foot interval.

Attachment A

ATTACHMENT B

SURFACE IMPOUNDMENT SYSTEM
CLOSURE PLAN AND SAMPLING RESULTS

Monsanto

MONSANTO CHEMICAL COMPANY
No. 1 Monsanto Road
Nitro, West Virginia 25143
Phone: (304) 755-3341

October 16, 1986

Mr. Craig A. Lyle, P.E.
Ackenheil and Associates
P. O. Box 416
Nitro, WV 25143

Dear Craig:

Enclosed is the closure plan for the surface impoundment system, a revised sampling drawing and the results of the analysis for pH.

Please note that there were some field modifications to the sampling plan. The modifications were: the elimination of two sampling points, the combination of the liquid and sludge components for eleven of the thirteen samples and moving sample point 1 to the east of its original position. All of these modifications were approved by the on-site DNR representatives.

The closure plan also includes the dismantling of the limestone bed. Although the dismantling will occur in the near future, we would like to consider the complete closure a two-phase process. The first phase being the sampling of the basins and the second being the dismantling of the limestone bed. We would also like each phase of the closure to be certified separately. Therefore, unless you need additional information, the enclosed package will complete Phase 1.

If you have any questions, please call me.

Sincerely,

James E. Fleer
Environmental Engineer

eb

Enclosure

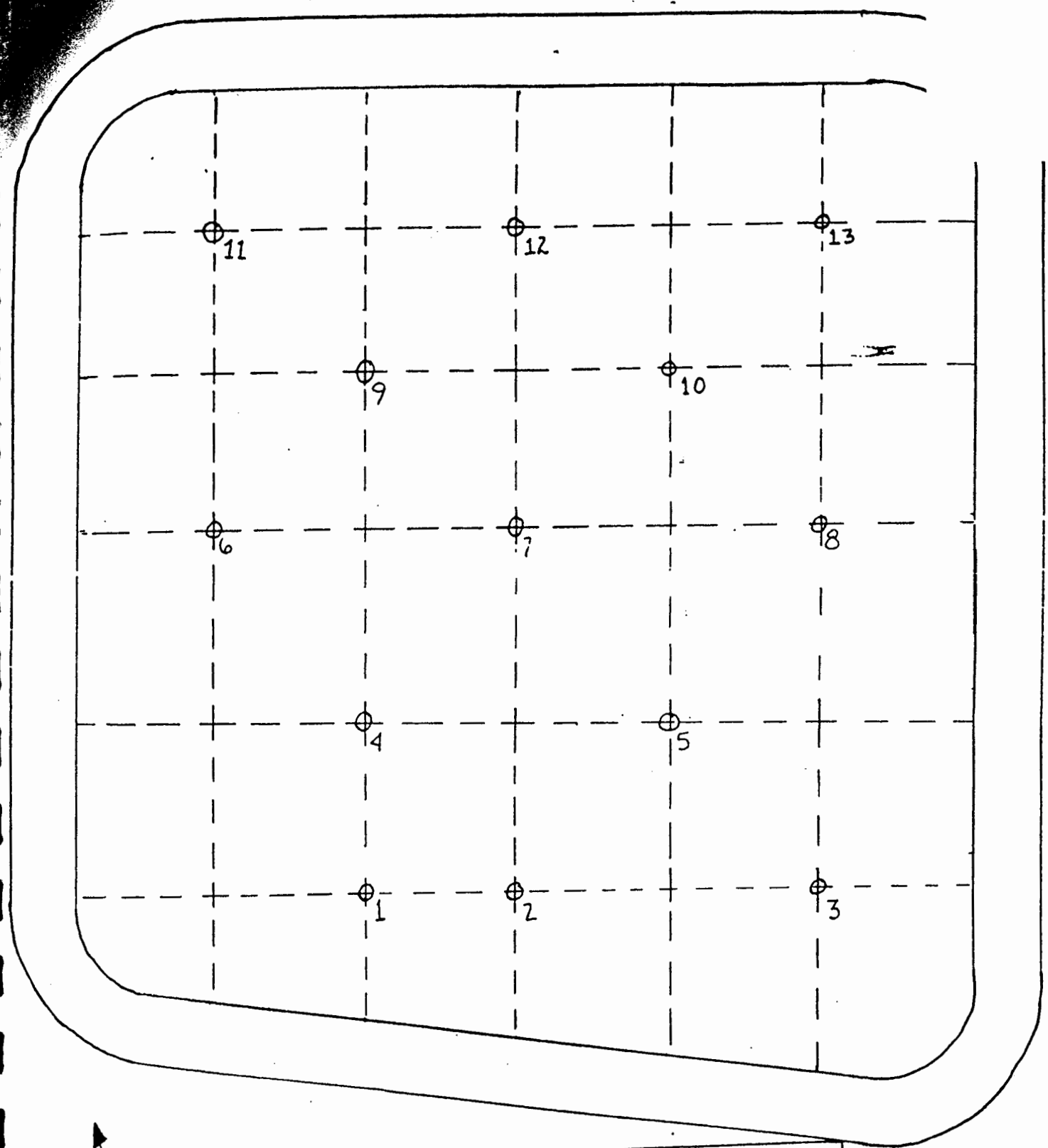
RESULTS OF BASIN SAMPLING

PERFORMED ON SEPT. 25, 1986

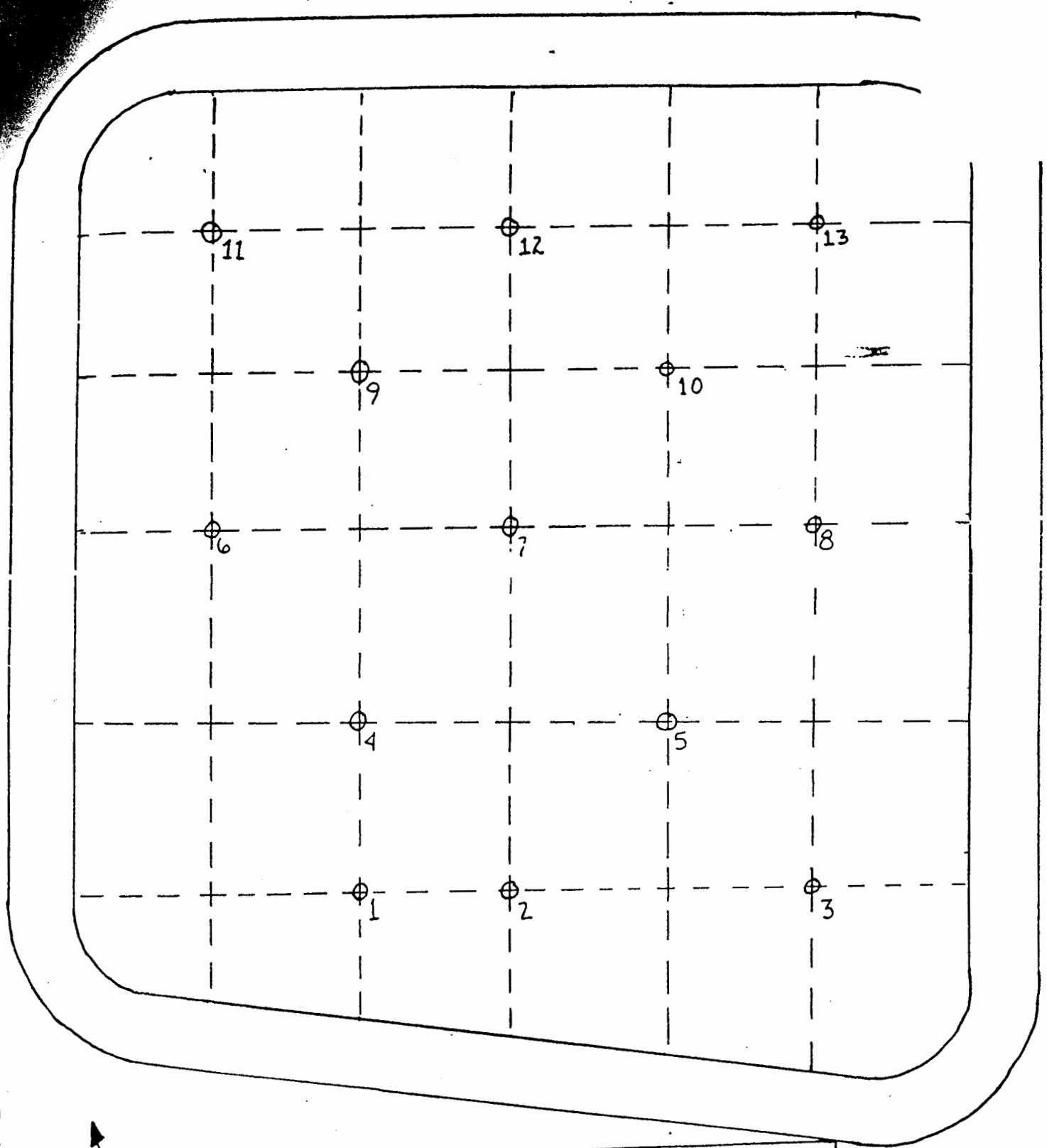
Sample Point	Soil	Sludge	Liquid
1	4.2	7.54	7.54*
2	4.1	5.75	5.75*
3	4.3	5.42	5.42*
4	4.0	6.60	6.60*
5	4.4	6.35	6.35*
6	4.9	6.76	6.76*
7	4.4	5.75	5.75*
8	4.3	5.00	4.29
9	4.7	5.52	5.52*
10	4.9	5.70	5.70*
11	4.4	6.97	6.97*
12	4.5	6.17	6.17*
13	4.6	5.10	5.71

*For these samples, the liquid/sludge interface was not discernable. Therefore, per Rebecca J. Robertson, the liquid and sludge portion was combined and the result reported is for the combined material.

Revised Sampling Locations.



Revised Sampling Locations.



RESULTS OF BASIN SAMPLING

PERFORMED ON SEPT. 25, 1986

Sample Point	Soil	Sludge	Liquid
1	4.2	7.54	7.54*
2	4.1	5.75	5.75*
3	4.3	5.42	5.42*
4	4.0	6.60	6.60*
5	4.4	6.35	6.35*
6	4.9	6.76	6.76*
7	4.4	5.75	5.75*
8	4.3	5.00	4.29
9	4.7	5.52	5.52*
10	4.9	5.70	5.70*
11	4.4	6.97	6.97*
12	4.5	6.17	6.17*
13	4.6	5.10	5.71

*For these samples, the liquid/sludge interface was not discernable. Therefore, per Rebecca J. Robertson, the liquid and sludge portion was combined and the result reported is for the combined material.

Monsanto

FROM (NAME—LOCATION—PHONE) : J. E. FLEER - NITRO PLANT - EXT. 459

DATE : July 29, 1986

cc A. C. Tuk
K. S. Miller

SUBJECT : WTP "CLEAN CLOSURE"

REFERENCE :

TO : R. T. Parker

Shortly after the startup of the pre-neutralization project, we will be required to sample the liquids, sludges and underlying soil from the emergency basin and analyze the samples for the characteristic of corrosivity. The sampling plan that we have submitted to the State indicates that samples will be taken at 15 locations and each location will have a liquid, sludge and soil component (a total of 45 samples).

We have contracted with Underwater Services to take the samples and have tentatively scheduled the work for the week of August 18. We would like the pH of the samples to be determined in our lab and I have attached the procedure for determining the pH of the soils and sludges.

If you have any problems with this plan or the scheduling, please call me.

James E. Fleer

J. E. Fleer

eb

NOTE: The procedure is essentially the same as that developed by the EPA for use in their toxicity characteristic leaching procedure (TCLP).

ATTACHMENT C

MONSANTO CORRESPONDENCE TO WEST VIRGINIA DIVISION OF WATER RESOURCES, NOVEMBER 4, 1995

P 090 280 999

Monsanto

POLYMER PRODUCTS COMPANY
Nitro, West Virginia 25143
Phone: (304) 755-3341

November 4, 1985

Mr. Jerome Cibrik
Division of Water Resources
1201 Greenbrier Street
Charleston, WV 25311

Dear Mr. Cibrik:

At our meeting on October 31, 1985, regarding the clean closure of our regulated surface impoundments, you requested that I provide you with a characterization of our influent.

Our wastewater is currently classified as a hazardous waste solely due to the characteristic of corrosivity. There are occasions during the course of a year (10 to 30 days) that the pH of the stream may fall in the range classifying it as hazardous waste. This is the only hazardous waste our wastewater treatment plant handles. We do not store or treat any listed hazardous wastes at our wastewater treatment plant.

We would expect to find some hazardous constituents in our influent because we use a number of the commercial chemical products included in the listing of hazardous wastes. We do not, however, dispose of any of these commercial chemical products at our wastewater treatment plant. Any of these substances that are found in our raw wastewater are generated through process wastes and are not considered hazardous wastes (see Adm. Reg. 20-5E, Series XV, Section 3.04.04 (d) comment).

We have included in Table I the typical composition of our raw wastewater. The values in this table represent the average concentration since January 1, 1985. They were arrived at by the routine analysis of our influent using a GC/LC to identify the specific chemicals. The methods used are designed to identify those substances we use as raw materials. Table II includes the major raw materials we use at the plant that are included on the hazardous waste lists. Most of the listed products are used in a closed system with no discharge to the sewer.

It is not possible to explain the presence of some of the constituents found in the groundwater beneath the wastewater treatment plant. Aside from a few of the identified chemicals we use in our laboratory and burn in our boilers, only benzene has been identified as a former raw material. We have not used benzene for 13 years and, to the best of our knowledge, it was never disposed of as a commercial chemical product at our facility. Trace quantities may have been found in our wastewater.

The Nitro plant does not dispose of any listed hazardous wastes at our wastewater treatment plant. We currently only store and treat a corrosive waste. Our plans are to pre-treat the wastewater and stop receiving hazardous wastes at our wastewater treatment plant in 1986.

We appreciate your help and hope this letter satisfies your needs.

Sincerely,

K. S. Miller
Envr. Specialist

sa

Attachments

PH DETERMINATION FOR SOLIDS AND SLUDGES

Solids

1. Weigh out a small sub-sample of the solid phase of the waste. If necessary, reduce the solid to a particle size of approximately 1 mm in dia. or less. Transfer a 5 gram portion to a 500 ml beaker or erlenmeyer flask.

2. Add 96.5 ml distilled deionized water, cover with watch glass and stir vigorously for 5 minutes using a magnetic stirrer.

3. Measure and record the pH.

Sludges

For sludges containing less than 0.5% solids by weight.

1. Weigh out a 100 gram sub-sample of sludge.

2. Allow sludges to stand to permit the solids to settle. Wastes that settle slowly may be centrifuged prior to filtration.

3. Assemble filter holder following manufacturer's instructions. Place the filter on the filter screen and secure. Wash the filter with distilled deionized water. Discard the wash water. (NOTE: The filter shall be made of borosilicate glass fiber, contain no binder materials and have an effective pore size of 0.6 - 0.8 μm or equivalent.)

4. Transfer waste sample to filter holder. Gradually apply vacuum or gentle pressure until air or gas moves through the filter. Filtration is stopped when gas begins to move through the filter or when liquid flow has ceased at 50 psi (i.e. does not result in any additional filtrate within any two minute period).

5. Measure pH of filtrate and record.

For sludges containing greater than 0.5% solids by weight.

The procedure for these materials is the same as the procedure for solids.

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